REMARKS

The Official Action of August 4, 2003 has been carefully considered and reconsideration of the application as amended is respectfully requested.

Applicants hereby affirm their election of the claims of Group I. Claims 1-19 and newly added claims 25-28 are directed to the elected invention. Claim 25 is directed to a composition comprising the recited carrier and a culture medium in accordance with the disclosure in the specification in, for example, the Examples beginning on page 7, and should be examined with the elected claims (see MPEP Section 806.05). Claim 27 is also supported by the disclosure in the Examples beginning on page 7. Claims 26 and 28 recite the "consisting essentially of" transitional to limit these claims to the recited elements/steps and those that do not materially affect the basic and novel properties of the claimed carrier (see MPEP Section 2111.03).

Claim 1 has been amended to incorporate the recitations formerly in claims 4 and 12 and these latter claims have been canceled. Claim 1 has also been amended by the incorporation of language from the Abstract. Claims 16-19 have also been amended to remove the informalities noted by the Examiner at paragraph 7 of the Official Action. The amendments to the claims are respectfully believed to remove the bases for the objections and rejections appearing at paragraphs 7 and 10 of the Official Action. All claims as amended are respectfully believed to be sufficiently

definite to satisfy the dictates of 35 USC 112, second paragraph.

Certain claims stand rejected under 35 USC 102(b) as allegedly being anticipated by Fukuda et al. Other claims stand rejected under 35 USC 103(a) as allegedly being unpatentable over Fukuda et al in view of Sussman et al. Applicants respectfully traverse these rejections.

The Claimed Invention

The claimed invention is directed to a carrier *for cell attachment or fixation in cell culture*, which is formed by the following steps; (a) forming a fiber by extruding a melted polymer from a nozzle; (b) extending the fiber and shaping the extended fiber to form a *three-dimensional branch-like* non-woven structure; and (c) treating the surface of the non-woven structure by an *activated grafting treatment* to make the surface have cell affinity.

In a preferred embodiment, the surface of the non-woven structure is activated at low pressure and then immediately grafted by reacting with gaseous monomer. In the activated grafting treatment of the present invention, no steps of adding reagents such as initiators and catalysts (which are essential for ordinary grafting polymerization, see below) are needed and thus problems of residual impurities and non-reactive reactants, which adversely affect cell affinity to the surface of the carriers and cell growth, will not be generated. In addition, the activated grafting treatment is conducted in *gaseous* phase (see claim 27), which results in a *uniform* grafting

reaction on the surface of a three-dimensional branch-like non-woven structure, and provides a desired cell affinity of the surface of the carriers for cell culture.

The Primary Reference

The primary reference, Fukuda et al, relates to a fiber material for selectively removing leukocytes comprising a fibrous and porous element, e.g., knits, fabric, a woven fabric and a non-woven fabric.

The fiber material of Fukuda is used for *selectively removing leukocytes*. The porous element of fiber material is prepared by decomposition-foaming methods and then subjected to secondary processing, or by the melt blow method and the flash spinning method and then subjected to secondary processing to obtain a specific pore diameter distribution (Column 8, lines 21 to 43). It is clear that the fiber material of Fukuda is formed as a *composite* structure, rather than a three-dimensional branch-like non-woven structure that is directly formed from, and consists essentially of, extended fibers and the grafted functional group (see claims 26 and 28).

The graft polymerization and plasma treatments mentioned in Fukuda to modify the surface of the porous element differ from the activated grafting treatment used in the present invention. In fact, the graft polymerization mentioned in Fukuda does not include a surface activating reaction, and the plasma treatment mentioned in Fukuda does not include a grafting reaction. In other words, the graft polymerization and plasma treatment of Fukuda are *separately and independently* performed. In

additin, the graft polymerization taught in Fukukda is an ordinary technique performed in *liquid* phase wherein reagents, such as initiators and catalysts, are needed to be added to the liquid phase under heating, which leads to residues of impurities and non-reactive reactants that are detrimental to cell culture. Apparently, these modification treatments taught in Fukuda are intended to modify the wetting properties and electrical properties (Column 12, line 51) of the surface of the porous element to allow leukocytes to adhere thereto for selectively removing leukocytes, but absolutely cannot provide a surface with desired cell affinity for cell attachment and growth for cell culture as required by the claims. The reference accordingly teaches away from the claimed invention. Also, the ordinary graft polymerization of the refernece cannot achieve a *uniform* grafting on the surface of a composite structure or a three-dimensional branch-like structure.

Given the above, the description in Fukuda does not anticipate or render obvious the claims which require a carrier that facilitates attachment and growth of cells. It does not anticipate or render obvious, and in fact teaches away from, a composition that includes a culture medium (see claim 25).

The Secondary Reference

The secondary reference, Sussman et al, relates to a matrix for use in cell cultivation providing a high-surface-area substrate comprising a physiologically acceptable network of fibers having a defined porosity and pore size. Sussman

teaches that the matrix may be used alone (single layer) or preferably bonded to a porous support sheet or screen providing for dimensional stability and physical strength (double layer) (Column 7, lines 8 to 10). However, the single layer matrix has the drawbacks of insufficient strength and the double layer matrix is complexly prepared.

Sussman teaches nothing above a carrier having a three-dimensional branch-like non-woven structure for cell culture prepared according to the process of the present invention, and cannot supplement the deficiencies of the primary reference, which are discussed above. Moreover, for reasons discussed above, the primary reference teaches away from its use in a combination that would arrive at the claimed invention.

In view of the above, it is respectfully submitted that all rejections and objections of record have been overcome and that the application is now in allowable form. An early notice of allowance is earnestly solicited and is believed to be fully warranted.

Respectfully submitted,

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